

## TRANSMITTAL LETTER TO THE UNITED STATES

1505

DESIGNATED/ELECTED OFFICE (DO/EO/US)

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

CONCERNING A FILING UNDER 35 U.S.C. 371

09/787572

INTERNATIONAL APPLICATION NO.

INTERNATIONAL FILING DATE

PRIORITY DATE CLAIMED

PCT/DE 00/02252

JULY 11, 2000

JULY 24, 1999

TITLE OF INVENTION

Joachim ZIMMER

APPLICANT(S) FOR DO/EO/US

WIPER SYSTEM DRIVE

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
  - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☒ has been transmitted by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☐ A copy of the International Search Report (PCT/ISA/210).
8. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ have been transmitted by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☐ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

## Items 13 to 18 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.  
A **SECOND** or **SUBSEQUENT** preliminary amendment.
16. ☐ A substitute specification.
17. ☐ A change of power of attorney and/or address letter.
18. ☒ Certificate of Mailing by Express Mail
19. ☐ Other items or information:

EF 215 953 410 US

U.S. APPLICATION NO. IF KNOWN, SEE 37 CFR	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
09/787572	PCT/DE 00/02252	1505

20. The following fees are submitted.:

**BASIC NATIONAL FEE ( 37 CFR 1.492 (a) (1) - (5) ) :**

- ☐ Search Report has been prepared by the EPO or JPO ..... \$930.00
- ☐ International preliminary examination fee paid to USPTO (37 CFR 1.482) ..... \$720.00
- ☐ No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) ..... \$790.00
- ☒ Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... \$1,070.00
- ☐ International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) ..... \$98.00

**ENTER APPROPRIATE BASIC FEE AMOUNT =****CALCULATIONS PTO USE ONLY**

Surcharge of **\$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE
Total claims	17 - 20 =	0	x \$18.00
Independent claims	1 - 3 =	0	x \$80.00
Multiple Dependent Claims (check if applicable).			<input type="checkbox"/>

<b>TOTAL OF ABOVE CALCULATIONS</b>	<b>=</b>	<b>\$1,000.00</b>
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Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (check if applicable). ☐

<b>SUBTOTAL</b>	<b>=</b>	<b>\$1,000.00</b>
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Processing fee of **\$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)).

<b>TOTAL NATIONAL FEE</b>	<b>=</b>	<b>\$1,000.00</b>
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Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). ☒

<b>TOTAL FEES ENCLOSED</b>	<b>=</b>	<b>\$1,040.00</b>
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Amount to be:	\$
refunded	
charged	\$

- ☐ A check in the amount of \_\_\_\_\_ to cover the above fees is enclosed.
- ☒ Please charge my Deposit Account No. **19-4675** in the amount of **\$1,040.00** to cover the above fees.  
A duplicate copy of this sheet is enclosed.
- ☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **19-4675** A duplicate copy of this sheet is enclosed.

**NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.**

SEND ALL CORRESPONDENCE TO:

**STRIKER, STRIKER & STENBY**  
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SIGNATURE

**MICHAEL J. STRIKER**

NAME

**27233**

REGISTRATION NUMBER

**MARCH 19, 2001**

DATE

UNITED STATES PATENT AND TRADEMARK OFFICE

Examiner:                      Group:                      Attorney Docket # 1505

Applicant(s) : ZIMMER, J.

Serial No. :                      :

Filed : Simultaneously

For : WIPER SYSTEM DRIVE

SIMULTANEOUS AMENDMENT

March 16, 2001

Honorable Commissioner of Patents and Trademarks  
Washington, D.C. 20231

S I R S:

Simultaneously with filing of the above identified application  
please amend the same as follows:

In the Claims:

Cancel all claims without prejudice.

Substitute the claims attached hereto.

REMARKS:

This Amendment is submitted simultaneously with filing of the above identified application.

With the present Amendment applicant has amended the claims so as to eliminate their multiple dependency.

Consideration and allowance of the present application is most respectfully requested.

09/787572  
532 Rec'd PCT/PTO 19 MAR 2001

Respectfully submitted,



Michael J. Striker  
Attorney for Applicant(s)  
Reg. No. 27233

09/787572  
532 Rec'd PCT/PTO 19 MAR 2001

Claims

5 1. A drive for a wiper system (10), having a wiper motor (18) which via a crank (22) and a joint rod (28) drives a drive lever (36) of a lever gear with a four-bar wiper lever (40), characterized in that a coupling rod (24) is pivotably connected to the crank (22) and is connected in articulated fashion to a guide rod (26) pivotably supported on a vehicle body, and the thus-formed coupling gear (20) is connected to the drive lever (36) via the joint rod (28).

2. The drive of claim 1, characterized in that the coupling rod (24) is a sheet-metal part (70, 72), which on each of its ends has a respective joint pin (84, 90), which is adjoined by the guide rod (26) and the crank (22), respectively, via a bearing shell (88).

3. The drive of claim 2, characterized in that at least one joint pin (84, 90) is fastened unilaterally to the coupling rod (24).

4. The drive of claim 1, characterized in that the coupling rod (24) has two sheet-metal parts (70, 72), between which it retains at least one joint pin (84) on its face ends.

5. The drive of claim 1, characterized in that the coupling rod (24), in forked ends, retains at least one joint pin (84).

6. The drive of claim 5, characterized in that the coupling rod (24) has two sheet-metal parts (70, 72), which are tacked locally together between the joint pins

(84) and thus form the forked ends.

7. The drive claim 1, characterized in that the crank (22), the coupling rod (24), and/or the guide rod (26) has offset bends (74, 76, 78) in the direction of motion and/or transversely thereto.

8. The drive of claim 1, characterized in that the wiper motor (18) is reversible.

9. The drive of claim 1, characterized in that one end of the guide rod (26) is supported on a mounting plate (42) via a bearing point (48).

10. The drive of claim 1, characterized in that the joints (52, 54) are embodied as ball joints (80, 82).

11. The drive of claim 1, characterized in that the wiper system (10) has at least two windshield wipers (12, 14), each of which is assigned one joint rod (28, 30), and that a joint peg (80) for a joint rod (28, 30) is disposed on the crank (22) or on the guide rod (26), and a further joint peg (82) for a further joint rod (28, 30) is disposed on the coupling rod (24).

12. The drive of claim 1, characterized in that the wiper system (10) has at least two windshield wipers (12, 14), each of which is assigned one joint rod (28, 30), and that a joint peg (80) for a joint rod (28) is disposed on the joint pin (84) for the crank (22) or on the joint pin (84) for the guide rod (26), and a further joint peg (82) for a further joint rod (28, 30) is disposed on the coupling rod (24).

13. The drive of claim 1, characterized in that the wiper system (10) has at least two windshield wipers (12, 14), each of which is assigned one joint rod (28, 30), and that a joint peg is embodied as a double double-ball peg (94).

14. The drive of claim 1, characterized in that the wiper system (10) has at least two windshield wipers (12, 14), each of which is assigned one joint rod (28, 30), and that two joint pegs (80, 82) for the joint rods (28, 30) are disposed, parallel to one another, on the coupling rod (24).

15. The drive of claim 8, characterized in that the joint pegs (80, 82, 94) or the joint pins (84, 90) are riveted to the crank (22), the guide rod (26), and the coupling rod (24), respectively.

16. The drive of claim 8, characterized in that the coupling rod (24) is formed of two metal sheets (70, 72), of which the sheet (72) remote from the joint pegs (80, 82, 94) is curved in the region of the joint pegs (82, 94) toward the other sheet (70) and is riveted to that sheet by means of the joint pegs (82, 94).

17. The drive of claim 1, characterized in that the drive lever (36) is embodied as a cross guide rod.

## Claims

1. A drive for a wiper system (10), having a wiper motor (18) which via a crank (22) and a joint rod (28) drives a drive lever (36) of a lever gear with a four-bar wiper lever (40), characterized in that a coupling rod (24) is pivotably connected to the crank (22) and is connected in articulated fashion to a guide rod (26) pivotably supported on a vehicle body, and the thus-formed coupling gear (20) is connected to the drive lever (36) via the joint rod (28).

2. The drive of claim 1, characterized in that the coupling rod (24) is a sheet-metal part (70, 72), which on each of its ends has a respective joint pin (84, 90), which is adjoined by the guide rod (26) and the crank (22), respectively, via a bearing shell (88).

3. The drive of claim 2, characterized in that at least one joint pin (84, 90) is fastened unilaterally to the coupling rod (24).

4. The drive of [one of the foregoing claims], claim 1, characterized in that the coupling rod (24) has two sheet-metal parts (70, 72), between which it retains at least one joint pin (84) on its face ends.

5. The drive of [one of the foregoing claims], claim 1, characterized in that the coupling rod (24), in forked ends, retains at least one joint pin (84).

6. The drive of claim 5, characterized in that the coupling rod (24) has two sheet-metal parts (70, 72), which are tacked locally together between the joint pins



(84) and thus form the forked ends.

7. The drive [of one of the foregoing claims], claim 1, characterized in that the crank (22), the coupling rod (24), and/or the guide rod (26) has offset bends (74, 76, 78) in the direction of motion and/or transversely thereto.

8. The drive of [one of the foregoing claims], claim 1, characterized in that the wiper motor (18) is reversible.

9. The drive of [one of the foregoing claims], claim 1, characterized in that one end of the guide rod (26) is supported on a mounting plate (42) via a bearing point (48).

10. The drive of [one of the foregoing claims], claim 1, characterized in that the joints (52, 54) are embodied as ball joints (80, 82).

11. The drive of [one of the foregoing claims], claim 1, characterized in that the wiper system (10) has at least two windshield wipers (12, 14), each of which is assigned one joint rod (28, 30), and that a joint peg (80) for a joint rod (28, 30) is disposed on the crank (22) or on the guide rod (26), and a further joint peg (82) for a further joint rod (28, 30) is disposed on the coupling rod (24).

12. The drive of [one of claims 1-10], claim 1, characterized in that the wiper system (10) has at least two windshield wipers (12, 14), each of which is assigned one joint rod (28, 30), and that a joint peg (80) for a

5 joint rod (28) is disposed on the joint pin (84) for the crank (22) or on the joint pin (84) for the guide rod (26), and a further joint peg (82) for a further joint rod (28, 30) is disposed on the coupling rod (24).

13. The drive of [one of claims 1-10], claim 1, characterized in that the wiper system (10) has at least two windshield wipers (12, 14), each of which is assigned one joint rod (28, 30), and that a joint peg is embodied as a double double-ball peg (94).

14. The drive of [one of claims 1-10], claim 1, characterized in that the wiper system (10) has at least two windshield wipers (12, 14), each of which is assigned one joint rod (28, 30), and that two joint pegs (80, 82) for the joint rods (28, 30) are disposed, parallel to one another, on the coupling rod (24).

15. The drive of [one of claims 8-11], claim 8, characterized in that the joint pegs (80, 82, 94) or the joint pins (84, 90) are riveted to the crank (22), the guide rod (26), and the coupling rod (24), respectively.

16. The drive of [one of claims 8-12], claim 8, characterized in that the coupling rod (24) is formed of two metal sheets (70, 72), of which the sheet (72) remote from the joint pegs (80, 82, 94) is curved in the region of the joint pegs (82, 94) toward the other sheet (70) and is riveted to that sheet by means of the joint pegs (82, 94).

17. The drive of [one of the foregoing claims], claim 1, characterized in that the drive lever (36) is embodied as a cross guide rod.

WIPER SYSTEM DRIVE

## Prior Art

The invention is based on a wiper system drive as generically defined by the preamble to claim 1.

5 Wiper systems with multiple windshield wipers for motor vehicles are fastened by their wiper bearings directly or indirectly via a mounting plate to the vehicle body. The mounting plate or a tubular mounting plate - if the wiper carrier also includes tubular  
10 hollow profiles - includes a motor mounting plate, which carries a wiper drive with a wiper motor and a gear mounted thereon. A power takeoff shaft of the gear is supported in a gear dome and, as a rule via a crank and joint rods, drives further cranks, which are solidly  
15 connected to a drive shaft for each windshield wiper.

It is also possible for the power takeoff shaft of the wiper motor to drive a four-bar lever mechanism. This mechanism has a drive lever, which is seated  
20 pivotably on a drive axis and is connected in articulated fashion to a guide rod lever via a coupling rod. This lever is pivotably supported on a stationary shaft. A fastening part of a wiper arm is formed integrally onto the coupling rod and with it forms a so-called four-bar wiper lever, to which the joint part of  
25 the wiper arm is fastened via a foldaway joint. The drive lever can be driven directly from a power takeoff shaft of the wiper motor or via a crank and joint rods. It can also be embodied as a cross lever. The kinematics of the four-bar lever mechanism effect a  
30 combined reciprocating and swiveling motion of the

windshield wiper. As a result, the windshield wiper is better able to follow the angular contour of a vehicle window. If two synchronized windshield wipers are provided, then as a rule only one is driven via a four-bar lever mechanism, while the other is connected to a driven element, via a joint rod and a crank.

So that the forces on the joint rods will be slight, the crank has a relatively great length. This means a long radius of the crank path, which together with the typically low ratio of the crank radius to the rod length of approximately  $1/4$  to  $1/7$  demands a correspondingly large structural volume and associated room to move for the wiper linkage. Furthermore, it leads to an inharmonious course of motion. Wiper drives with reversible wiper motors are also known, in which the crank on the power takeoff shaft of the wiper motor executes a virtually semicircular pivoting motion. This drive requires markedly less room to move for the crank on the wiper motor.

In the known drives, the position of the wiper motor determines the location and geometry of the drive curve for the joint rods. Since the wiper motor and the lever mechanism cannot be positioned arbitrarily however, because the space in the vehicle is limited and is used for other equipment, the result is often unfavorable kinematics, which leads to an unfavorable course of speed and acceleration for the lever mechanism and as a rule requires a large amount of room to move. The result is compromises, which adversely affect the quality and reliability of the wiper system.

From European Patent Disclosure EP 0 781 691 A1, a

wiper drive is known that comprises a wiper motor and a lever mechanism. An offset-bent drive crank is seated on the power takeoff shaft of the wiper motor. A joint rod, which is pivotably connected to the drive crank via a ball joint, is also pivotably connected by its free end, again via a ball joint, to a crank embodied as a crank plate, which is fastened to a drive shaft of a windshield wiper. Via a further ball joint, the crank plate is engaged by a second joint rod, which with its free end is pivotably connected to a crank that is fastened to a drive shaft for a second windshield wiper. The lever mechanism comprising cranks and joint rods is very complicated and requires a great amount of room to move.

#### Advantages of the Invention

According to the invention, a coupling rod which is pivotably connected to a guide rod pivotably supported on a vehicle body is connected in articulated fashion to the crank; the thus-formed coupling gear is connected to the drive lever via the joint rod. The coupling gear, which in particular requires only little, compact room for motion, if a reversible wiper motor is used, offers many opportunities for pivotably connecting the joint rods and driving them. Thus the kinematics of the wiper drive can be varied such that by the selected articulated connection of the joint rods to the coupling gear, an unfavorable position of the wiper motor can be compensated for. As a result, the position of the wiper motor can be selected freely in accordance with the space available in the vehicle, without having to accept the above-described disadvantages into the bargain.

5 The coupling rod can be a simple sheet-metal part,  
which on each of its ends has a joint pin that is  
adjoined by the guide rod and the crank, respectively,  
via a bearing shell. The joint pins can be fastened  
unilaterally to the coupling rod. To avoid bending  
forces at the attachment points between the joint pins  
and the coupling rod, it is expedient that the coupling  
rod have two sheet-metal parts, between which it retains  
at least one joint pin on its face ends. Because of the  
10 two-sided fastening of the joint pins and the bearing of  
the crank or guide rod between the fastening points, the  
bending forces are very slight.

15 If the crank, coupling rod and guide rod are  
located in the same plane, the joint pins can be  
embodied cylindrically. If not, ball joints can be  
provided instead. If the joint pins are fastened to the  
coupling rod on both of their face ends, then the  
coupling rod has a considerable height in the region of  
the joints. It is therefore advantageous to design the  
coupling rod in forked fashion on its ends, and it  
retains the joint pin in the fork. As a result, it can  
assume an arbitrary height between the joints, so that  
in the case of a shallow design of the coupling rod,  
freedom of motion for the levers and articulation points  
20 is assured. This kind of design is suitable both for  
die-cast coupling rods and for coupling rods made of  
sheet-metal parts.

25 If the coupling rod has two sheet-metal parts,  
then the sheet-metal parts are expediently tacked  
together locally between the joint pins. One sheet-  
metal part can be curved toward the other, so that  
because of the offset bending of the sheet-metal part in  
30

the longitudinal direction of the coupling rod, free room to move is obtained for further drive parts. The coupling rod can also have offset bends transversely to the direction of motion, which assure freedom of motion for other drive parts.

The joint rods can be pivotably connected at various points of the coupling gear. This purpose is served by ball pegs, which are disposed for instance on the crank of the wiper motor, on the guide rod, on the coupling rod between the joints, or at the joint pins. If the ball pegs are disposed on the crank of the wiper motor or on the coupling rod or on the guide rod, then typically they are secured by wobble riveting. If the coupling rod is locally tacked together between the joint pins, this can also be done by means of a ball peg which joins the two sheet-metal parts to one another in this region by wobble riveting.

A plurality of windshield wipers, as a rule two, can be driven via the coupling gear. In that case, many ball pegs should be provided, which can also be embodied as double-ball pegs.

#### Drawing

Further advantages will become apparent from the ensuing description of the drawing. In the drawing, exemplary embodiments of the invention are shown. The drawing, description and claims include numerous characteristics in combination. One skilled in the art will expediently consider the characteristics individually as well and put them together to make useful further combinations.

Shown are:

Fig. 1, a schematic illustration of a wiper system;

Fig. 2, a schematic illustration of a wiper motor with a coupling gear and various motion curves;

Fig. 3, a perspective view of a coupling gear according to the invention;

Fig. 4, a side view of a bearing point of the coupling rod in section;

Figs. 5-6, variants of Fig. 4;

Fig. 7, a longitudinal section through a coupling rod; and

Figs. 8-10, variants of Fig. 7.

#### Description of the Exemplary Embodiments

The wiper system 10 has two windshield wipers 12 and 14. The windshield wiper 14 is driven by a wiper motor 18 via a coupling gear 20 and a joint rod 30. The joint rod is connected in articulated fashion to a crank 32, which drives a drive shaft 34 on which the windshield wiper 14 is seated. Upon actuation, the windshield wiper executes a simple swiveling motion about the drive shaft 34.

The coupling gear 20 includes a crank 22, a further coupling rod 24 pivotably connected to the crank



via a joint 50, and a guide rod 26, which is connected on one end via a joint 54 to the coupling rod 24 and by its other end is pivotably supported at a bearing point 48 on the vehicle, or on a mounting plate 42 solidly connected to the vehicle. The crank 22 is driven by the wiper motor 18, which is a reversing motor, and the joint 50 between the crank 22 and the coupling rod 24 describes a motion curve 56.

The wiper 12 is fastened to a four-bar wiper lever 40, which is pivotably connected to a guide rod 38 and to a drive lever in the form of a cross guide rod 36. The guide rod 38 and the cross guide rod 36 are pivotably supported in respective bearing points 44 and 46 on the mounting plate 42. Because of the four-bar wiper lever 40, the windshield wiper 12 executes a reciprocating and swiveling motion and creates a swept field 16 that conforms well to an angular contour of a windshield well.

The cross guide rod 46 is driven by a joint rod 28, which is pivotably connected at a joint 52 having a ball peg 80 between the joints 50 and 54 of the coupling rod 24. During the actuation of the wiper motor 18, the joint 52 describes a motion curve 60 with a very shallow course, so that the joint rod 28 essentially executes a reciprocating motion and thus needs only very little room to move, and this amount of room varies hardly at all if the spacing between the wiper motor 18 and the drive lever 36 varies. Fig. 2, on a larger scale, shows the motion curves 56 of the joint 50 and of the joint 52. Alternative motion curves 62 for an articulation point 68 and a motion curve 64 for an articulation point 66 are also shown. The motion curve 58 illustrates the

swiveling motion of the guide rod 26 about the bearing point 48 and thus the end of the joint rod 30 for the actuation of the windshield wiper 14.

Depending on the disposition of the wipers 12 and 14 and on the position of the wiper motor 18, the joint rods 28, 30 can be articulated at suitable articulation points of the coupling gear 20.

The version of the coupling gear 20 in Fig. 3 has a crank 22 with an offset bend 74 in the direction of motion. Upon a swiveling motion in the direction of the arrow 86, this enables freedom from collision with a ball peg 82 on the coupling rod 24. The coupling rod 24 in turn also has offset bends 76 and 78, which assure freedom from collision with other drive parts.

The version of Fig. 4 has a joint pin 84 with a formed-on ball peg 80. The joint pin 84 is connected to a coupling rod 24, which comprises two sheet-metal parts 70 and 72, the joint pin being riveted to the sheet-metal part 72, while the other sheet-metal part 70 is retained between a bearing shell 88 and the ball peg 80. The bearing shell 88 is solidly connected to the crank 22, preferably being cast integral as a plastic part. The version of Fig. 5 differs from the version of Fig. 4 in that the joint pin 84 is unilaterally connected to a coupling rod, which comprises a single sheet-metal part 96 or a corresponding die-cast part. In the version of Fig. 6, a joint pin 90 is riveted unilaterally to the crank 22. Between the crank 22 and a collar of the joint pin 90, the bearing shell 88 is provided, which is solidly connected to the coupling rod 24.

In the versions of Figs. 7-10, the coupling rod 24 comprises two sheet-metal parts 70 and 72, which are forklike on their ends, being tacked together in a middle region. In the forks on their ends, the sheet-metal parts 70, 72 retain joint pins 84 with bearing shells 88, to which the crank 22 and the guide rod 26, respectively, are fastened.

In the version of Fig. 7, one ball peg 80 is secured to the crank 22, while a further ball peg 82 is disposed on the coupling rod 24 between the joint pins 84. The sheet-metal parts 70 and 72 are tacked together by the ball peg 82, and the sheet-metal part 72 is curved toward the sheet-metal part 70 and forms an offset bend 92, to assure freedom from collision with other drive parts.

In a distinction from the version of Fig. 7, the ball peg 80 in Fig. 8 is integrally embodied with the joint pin 84. Fig. 9 shows a version in which a double-ball peg 94 suitably replaces the ball peg 82 of the versions in Figs. 7 and 8. Finally, in the version of Fig. 10, the ball pegs 80 and 82 are disposed side by side on the coupling part 24 between the joint pins 84. By means of them, the sheet-metal parts 70 and 72 are joined together in the same way as in the versions of Figs. 7-9. As a result, there are numerous possible ways of varying the locations and designs of the articulation points of the joint rods 28, 30.

## Claims

1. A drive for a wiper system (10), having a wiper motor (18) which via a crank (22) and a joint rod (28) drives a drive lever (36) of a lever gear with a four-bar wiper lever (40), characterized in that a coupling rod (24) is pivotably connected to the crank (22) and is connected in articulated fashion to a guide rod (26) pivotably supported on a vehicle body, and the thus-formed coupling gear (20) is connected to the drive lever (36) via the joint rod (28).

2. The drive of claim 1, characterized in that the coupling rod (24) is a sheet-metal part (70, 72), which on each of its ends has a respective joint pin (84, 90), which is adjoined by the guide rod (26) and the crank (22), respectively, via a bearing shell (88).

3. The drive of claim 2, characterized in that at least one joint pin (84, 90) is fastened unilaterally to the coupling rod (24).

4. The drive of one of the foregoing claims, characterized in that the coupling rod (24) has two sheet-metal parts (70, 72), between which it retains at least one joint pin (84) on its face ends.

5. The drive of one of the foregoing claims, characterized in that the coupling rod (24), in forked ends, retains at least one joint pin (84).

6. The drive of claim 5, characterized in that the coupling rod (24) has two sheet-metal parts (70,

72), which are tacked locally together between the joint pins (84) and thus form the forked ends.

7. The drive of one of the foregoing claims, characterized in that the crank (22), the coupling rod (24), and/or the guide rod (26) has offset bends (74, 76, 78) in the direction of motion and/or transversely thereto.

8. The drive of one of the foregoing claims, characterized in that the wiper motor (18) is reversible.

9. The drive of one of the foregoing claims, characterized in that one end of the guide rod (26) is supported on a mounting plate (42) via a bearing point (48).

10. The drive of one of the foregoing claims, characterized in that the joints (52, 54) are embodied as ball joints (80, 82).

11. The drive of one of the foregoing claims, characterized in that the wiper system (10) has at least two windshield wipers (12, 14), each of which is assigned one joint rod (28, 30), and that a joint peg (80) for a joint rod (28, 30) is disposed on the crank (22) or on the guide rod (26), and a further joint peg (82) for a further joint rod (28, 30) is disposed on the coupling rod (24).

12. The drive of one of claims 1-10, characterized in that the wiper system (10) has at least two windshield wipers (12, 14), each of which is

5 assigned one joint rod (28, 30), and that a joint peg (80) for a joint rod (28) is disposed on the joint pin (84) for the crank (22) or on the joint pin (84) for the guide rod (26), and a further joint peg (82) for a further joint rod (28, 30) is disposed on the coupling rod (24).

13. The drive of one of claims 1-10, characterized in that the wiper system (10) has at least two windshield wipers (12, 14), each of which is assigned one joint rod (28, 30), and that a joint peg is embodied as a double double-ball peg (94).

14. The drive of one of claims 1-10, characterized in that the wiper system (10) has at least two windshield wipers (12, 14), each of which is assigned one joint rod (28, 30), and that two joint pegs (80, 82) for the joint rods (28, 30) are disposed, parallel to one another, on the coupling rod (24).

15. The drive of one of claims 8-11, characterized in that the joint pegs (80, 82, 94) or the joint pins (84, 90) are riveted to the crank (22), the guide rod (26), and the coupling rod (24), respectively.

16. The drive of one of claims 8-12, characterized in that the coupling rod (24) is formed of two metal sheets (70, 72), of which the sheet (72) remote from the joint pegs (80, 82, 94) is curved in the region of the joint pegs (82, 94) toward the other sheet (70) and is riveted to that sheet by means of the joint pegs (82, 94).

17. The drive of one of the foregoing claims,

characterized in that the drive lever (36) is embodied  
as a  
cross guide rod.

## Abstract

The invention is based on a drive for a wiper system (10), having a wiper motor (18) which via a crank (22) and a joint rod (28) drives a drive lever (36) of a lever gear with a four-bar wiper lever (40).

It is proposed that a coupling rod (24) is pivotably connected to the crank (22) and is connected in articulated fashion to a guide rod (26) pivotably supported on a vehicle body, and the thus-formed coupling gear (20) is connected to the drive lever (36) via the joint rod (28).

(Fig. 1)

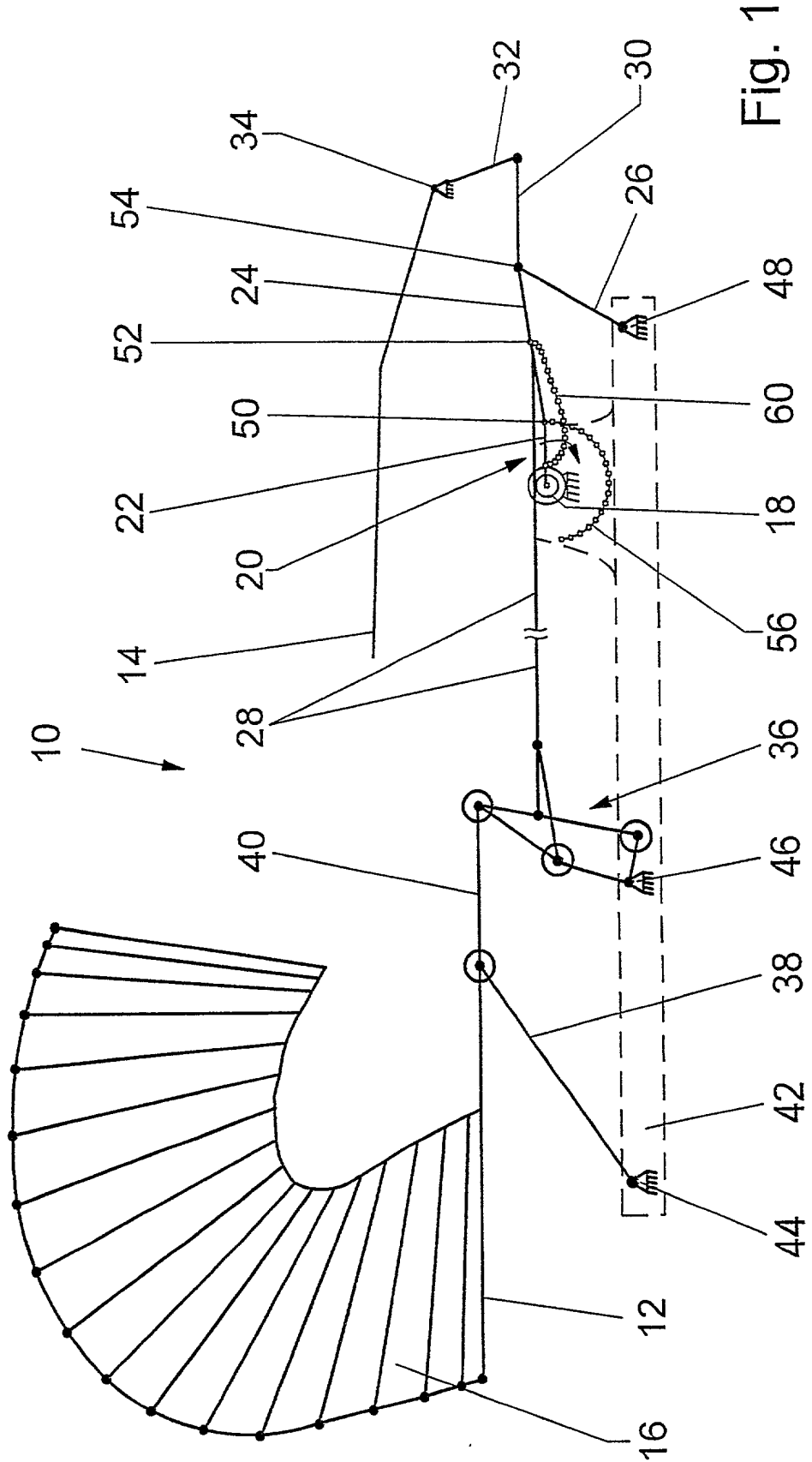


## List of Reference Numerals

10	Wiper system
12	Windshield wiper
14	Windshield wiper
16	Swept area
18	Wiper motor
20	Coupling gear
22	Crank
24	Coupling rod
26	guide rod
28	Joint rod
30	Joint rod
32	Crank
34	Drive shaft
36	Drive lever
38	guide rod
40	Four-bar wiper lever
42	Mounting plate
44	Bearing point
46	Bearing point
48	Bearing point
50	Joint
52	Joint
54	Joint
56	Motion curve
58	Motion curve
60	Motion curve
62	Motion curve
64	Motion curve
66	Articulation point
68	Articulation point
70	Sheet-metal part

72 Sheet-metal part  
74 Offset bend  
76 Offset bend  
78 Offset bend  
80 Ball peg  
82 Ball peg  
84 Joint pin  
86 Direction of arrow  
88 Bearing shell  
90 Joint pin  
92 Offset bend  
94 Double-ball peg  
96 Sheet-metal part

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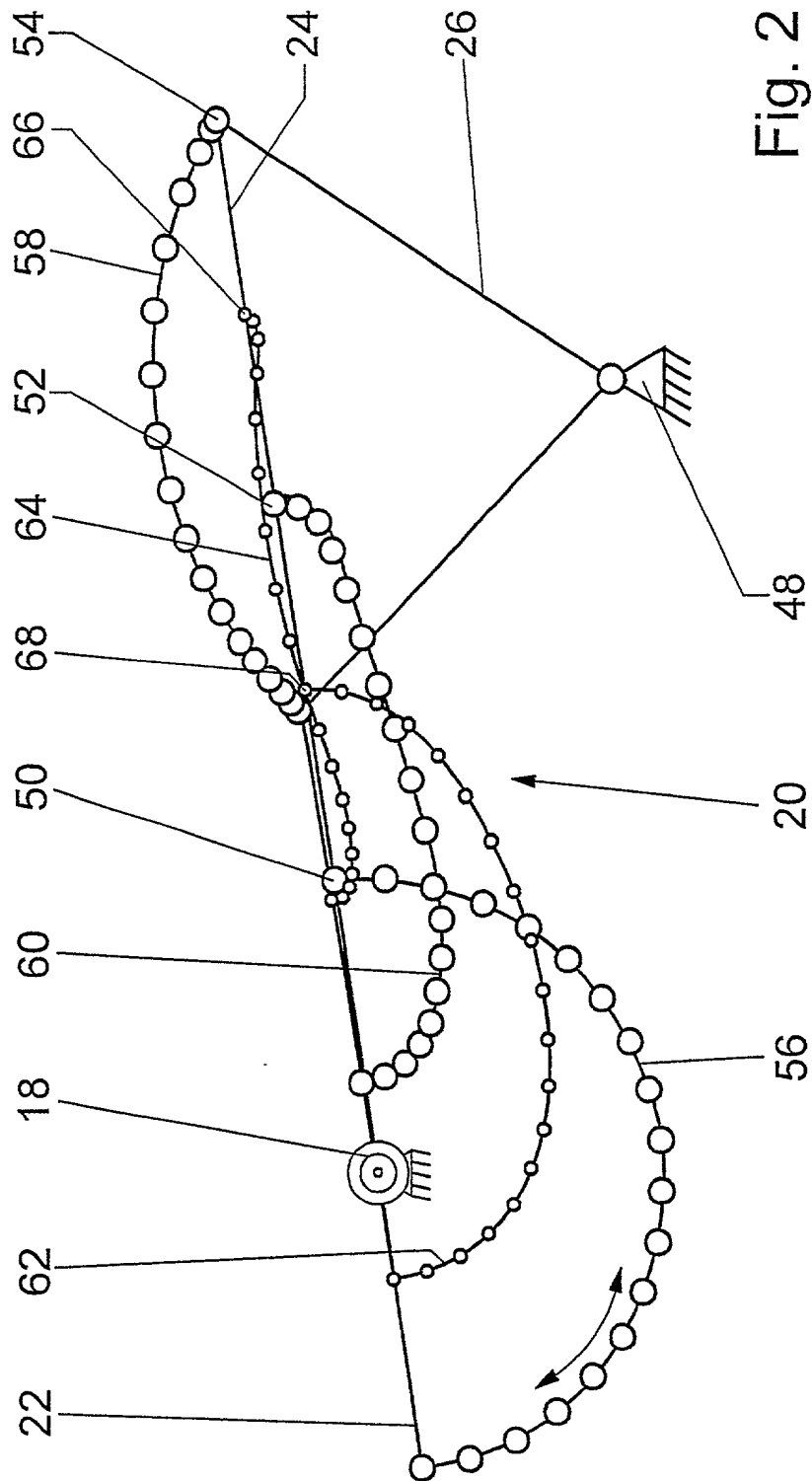
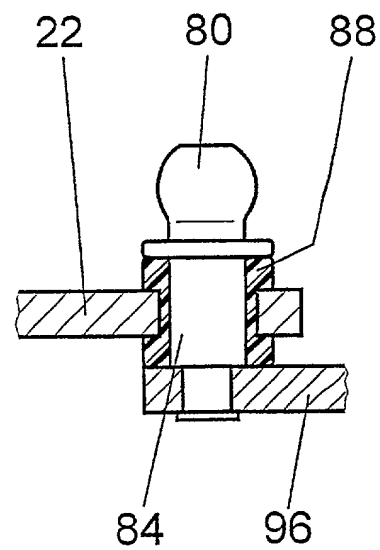
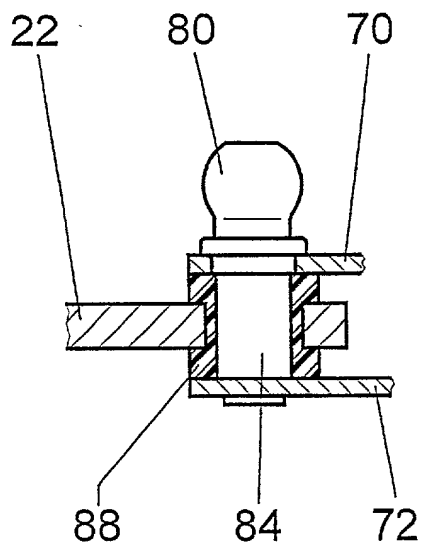
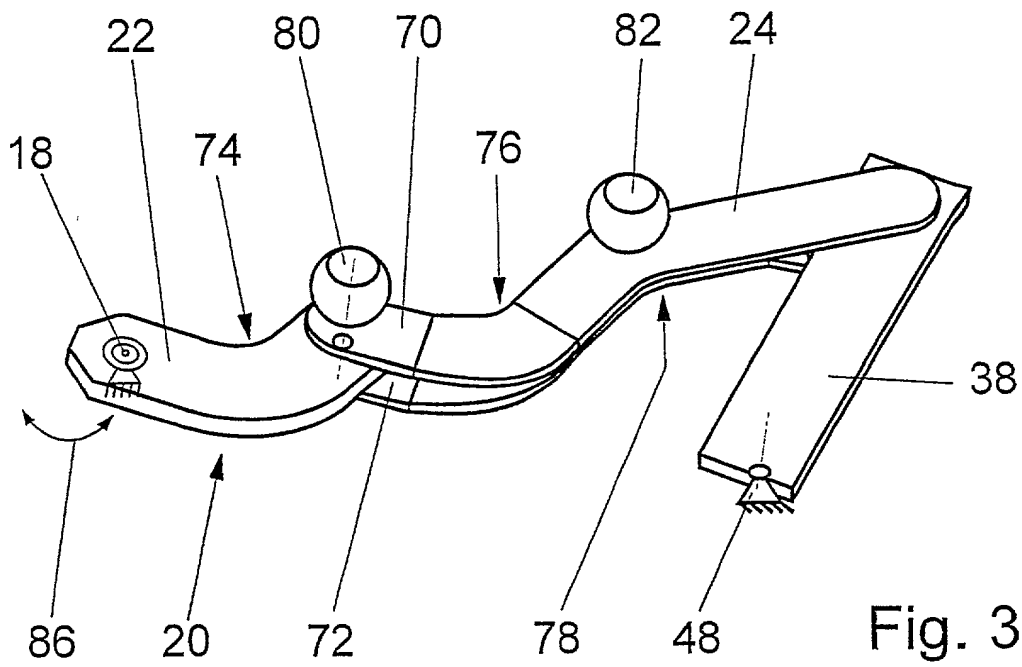


Fig. 2

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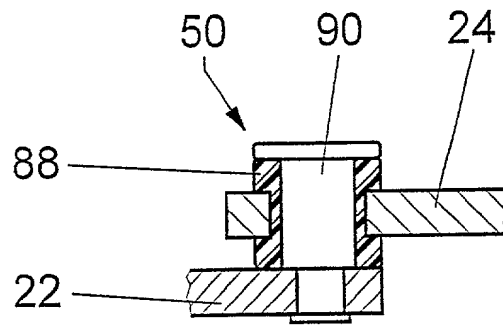


Fig. 6

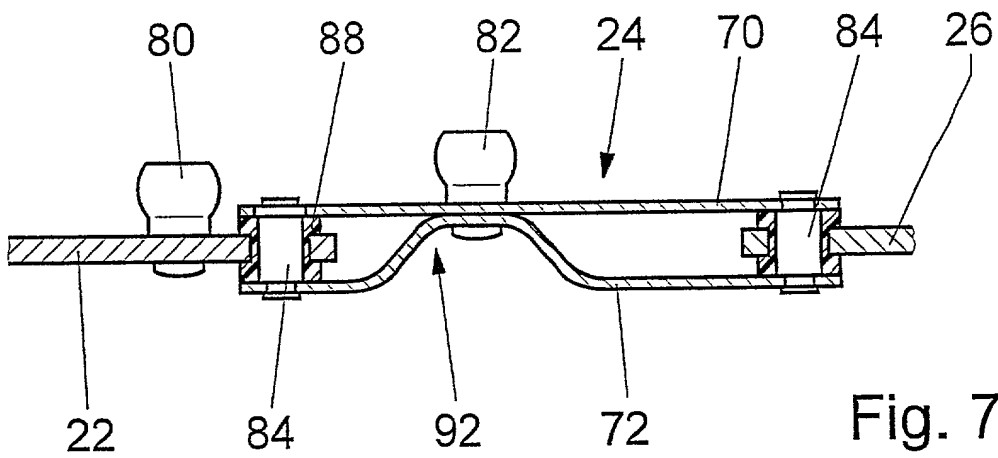


Fig. 7

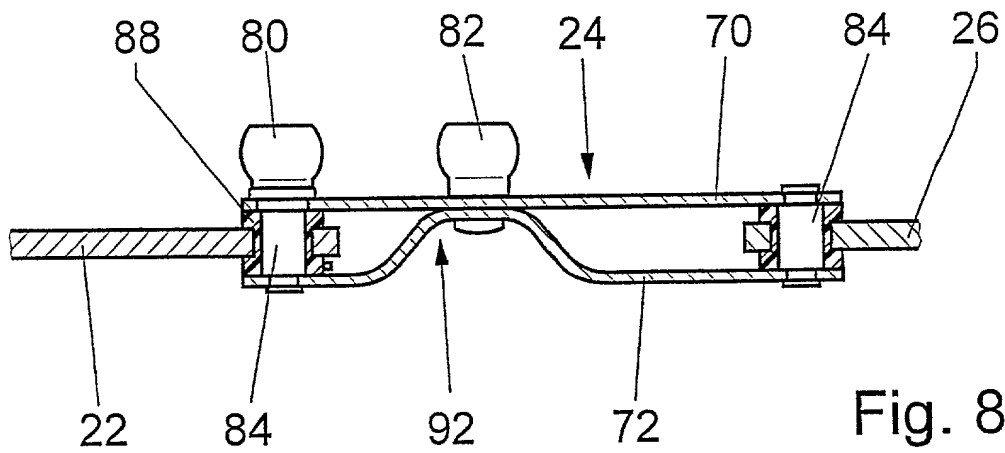


Fig. 8

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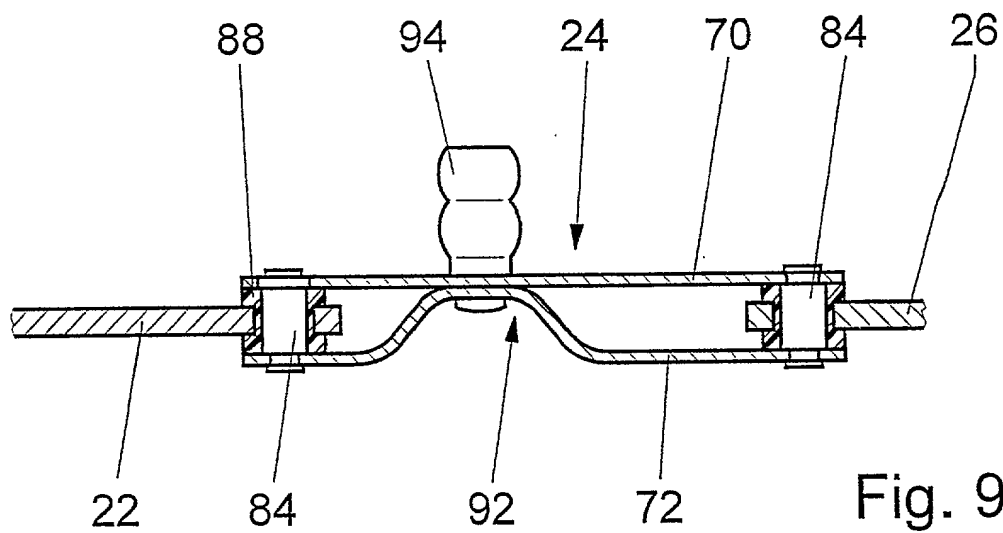


Fig. 9

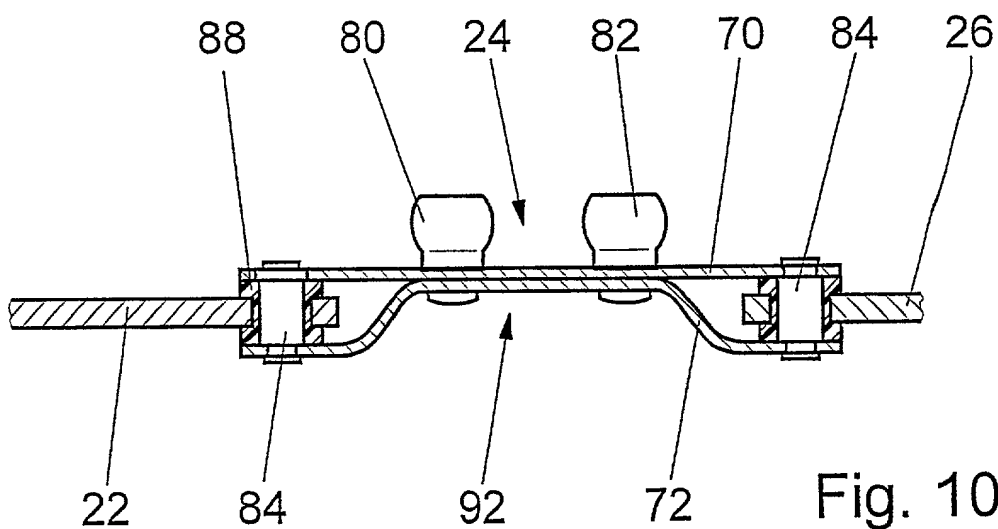


Fig. 10

March 8, 2001

DECLARATION

The undersigned, Jan McLin Clayberg, having an office at 5316 Little Falls Road, Arlington, VA 22207-1522, hereby states that she is well acquainted with both the English and German languages and that the attached is a true translation to the best of her knowledge and ability of International Patent Application PCT/DE 00/02252 of ZIMMER, J., entitled "WIPER SYSTEM DRIVE".

The undersigned further declares that the above statement is true; and further, that this statement was made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or document or any patent resulting therefrom.

  
Jan McLin Clayberg



R.34966

**DECLARATION AND POWER OF ATTORNEY FOR NATIONAL STAGE OF PCT PATENT APPLICATION**

As a below-named inventor, I hereby declare that:

Joachim ZIMMER

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **WIPER SYSTEM DRIVE** the specification of which was filed as PCT International Application number PCT/DE 00/02252 on July 11, 2000.

I hereby state that I believe the named inventor or inventors in this Declaration to be the original and first inventor or inventors of the subject matter which is claimed and for which a patent is sought.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365 (b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior foreign application(s):

Priority claimed:

<u>199 34 869.3</u>	<u>GERMANY</u>	<u>JULY 24, 1999</u>	<u>X</u>	
(Number)	(Country)	(Date filed)	Yes	No
_____	_____	_____	Yes	No
(Number)	(Country)	(Date filed)	Yes	No

As a named inventor, I hereby appoint the following attorney to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

Michael J. Striker, Reg. No. 27233

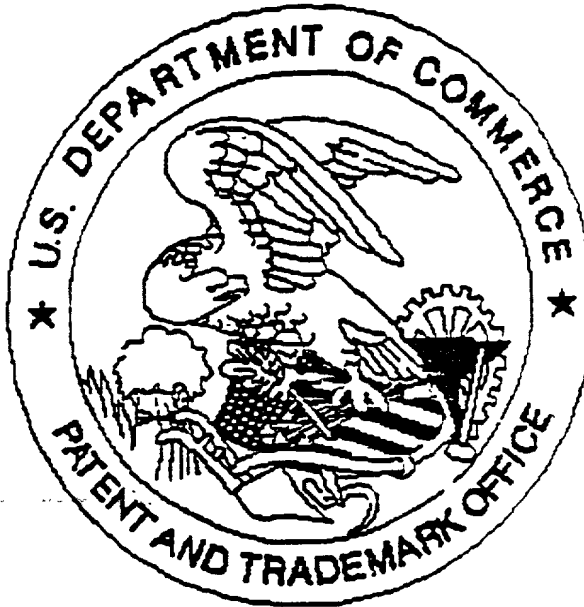
Direct all telephone calls to Striker, Striker & Stenby at telephone no.: (631) 549 4700 and address and all correspondence to:

STRIKER, STRIKER & STENBY  
103 East Neck Road  
Huntington, New York 11743  
U.S.A.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such wilful false statement may jeopardize the validity of the application or any patent issued thereon.

Signature: <i>X / J. Zimmer</i>	Date: <i>X 06.08.2001</i>	Residence and Full Postal Address: Uhlandstrasse 5 77880 Sasbach Germany <i>DEX</i>
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*There were 5 sheets of drawings.*

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